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Performance development of styrene-butadiene copolymer-modified calcium sulfoaluminate cement mortar under different curing conditions

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Results

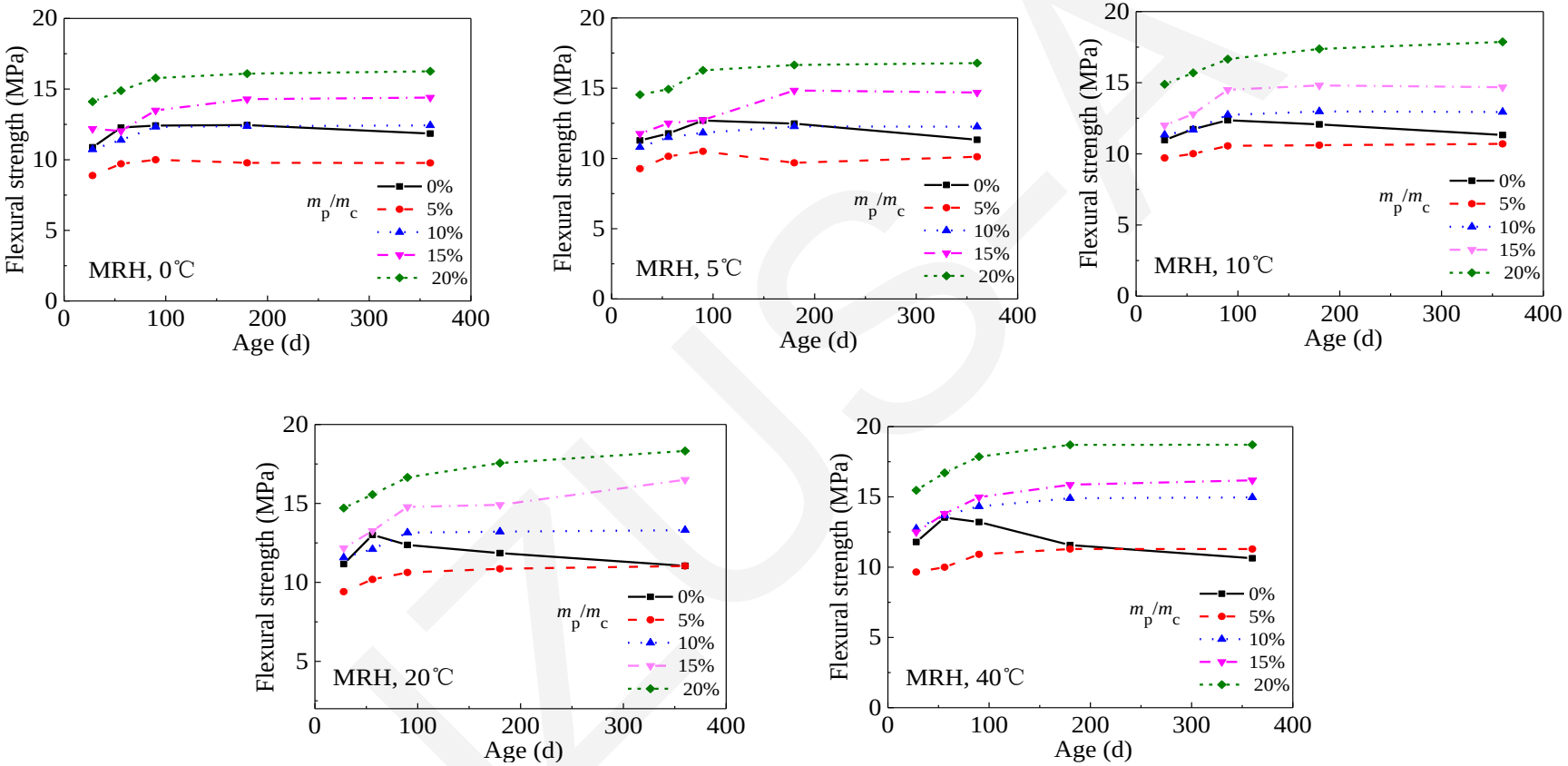

Fig. 3 Effect of SB content (m_p/m_c) on the flexural strength development of CSA cement mortars cured at MRH and different temperatures.

Results

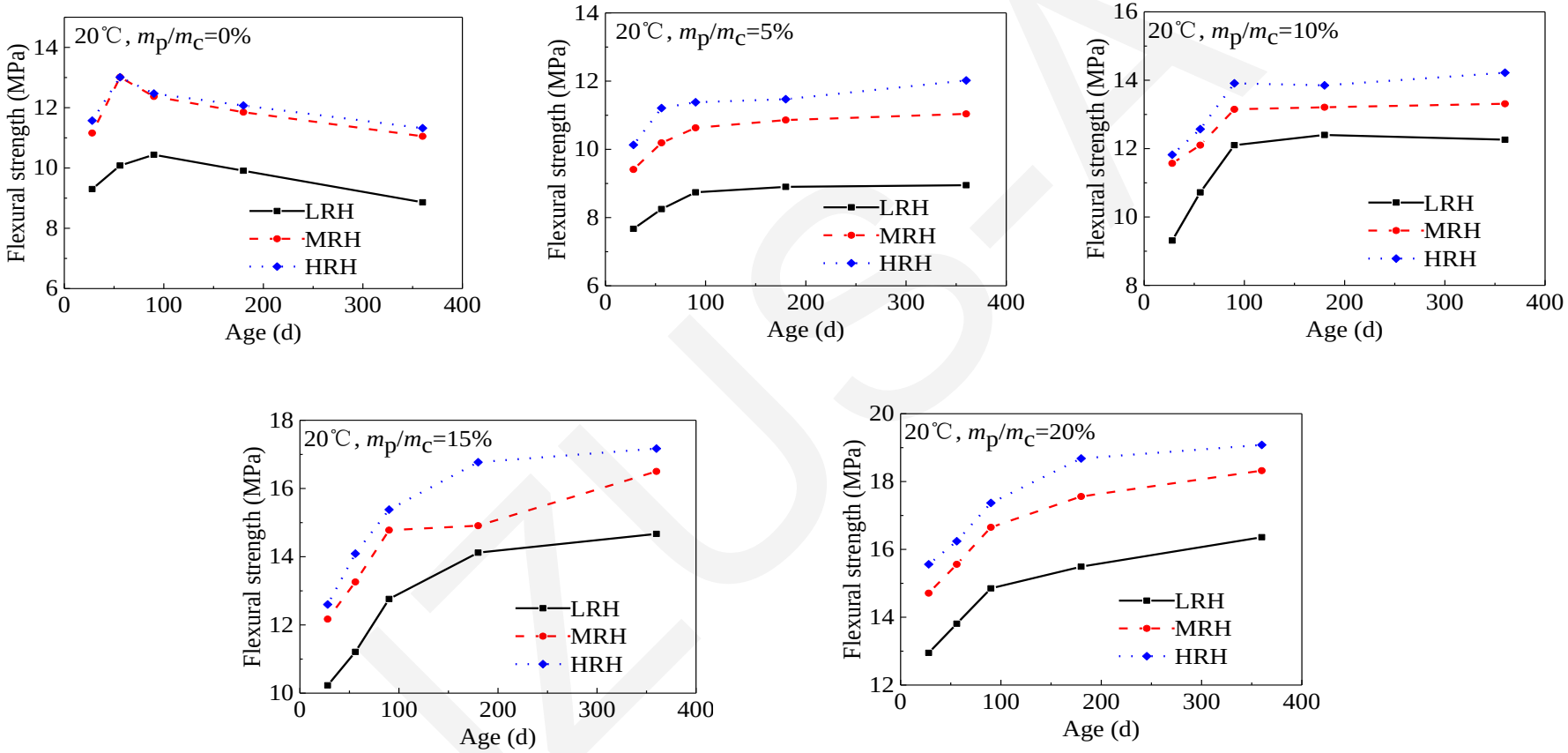

Fig. 5 Effect of relative humidity on the flexural strength development of reference and SB dispersion modified CSA cement mortars at 20 °C.

Conclusions

(1) The flexural, compressive, and tensile bond strengths of RM increase first and reach a maximum at a certain curing age, then show a reduction with the extension of curing up to 360 d. In contrast, these strengths of SBMM show a continuous increase with curing age. Reductions in all forms of strength of CSA cement mortar with age are restricted by SB dispersion.

(2) The tensile bond strength grows continuously as SB content increases, whereas only more than 10% SB addition is beneficial to the development of flexural strength, compressive strength, and waterproofness.

Conclusions

(3) Temperature has different effects on the performance development of RM and SBMM. In RM, higher temperature favors the growth of tensile bond strength in the early stages of curing, but causes serious reductions in the flexural and compressive strengths after prolonged curing. But in SBMM higher temperature is beneficial to all strength development. The WCA of both RM and SBMM increases with increasing temperature. Higher RH is conducive to the improvement of all properties of all mortars.

(4) SEM observations of RM showed that higher temperature will reduce the amount of AFt and change its microscopic shape, but will lead to the formation of more and smaller AH_3. An increase of RH can promote the formation of the main hydration products. SEM images of SBMM showed that the morphology of SBMM is denser than that of RM, and AFt is more visible at higher temperatures and RH.